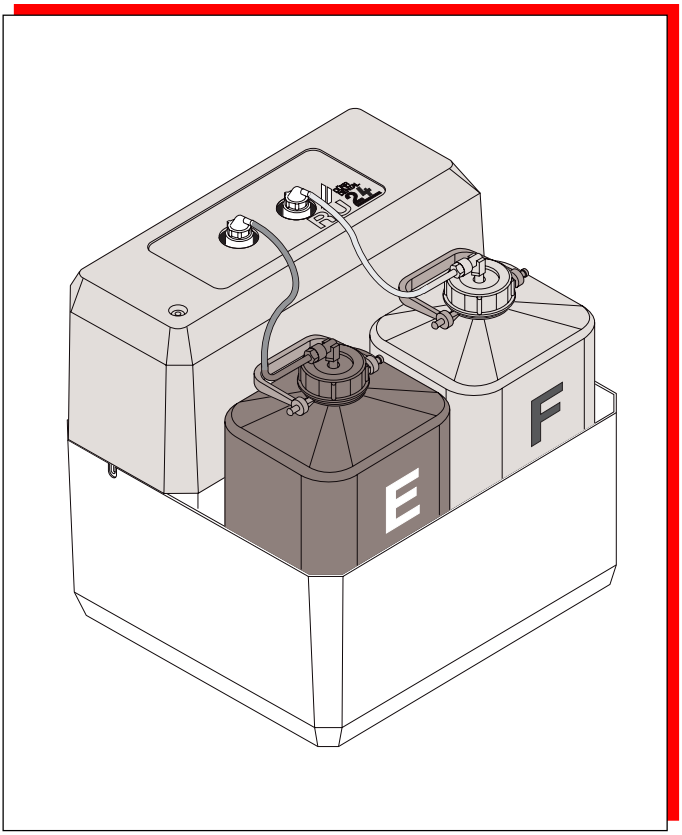
DÜRR DENTAL

GB

Installation and Operating Instructions
DÜRR Regeneration Unit for X-ray developers
XR 24, XR24 II, XR 24 Nova, XR 24 Pro



CE

9000-600-77/30

2006/01

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IMPORTANT INFORMATION

1. Notes

1.1 CE - Labeling

This product bears the CE- Labeling in accordance with the guidelines of the Medical Products Committee 93/42/EWG and satisfies all criteria of the Appendix I to said guidelines.

1.2 Electromagnetic Compatibility

- This product conforms to all requirements laid down for Electromagnetic Compatibility of Medical Appliances.

1.3 General Notes

- These Installation and Operating Instructions form an integral part of the unit. They must be kept close to the unit and in readiness whenever required. Precise observance of these instructions is a pre-condition for use of the unit for the intended purpose and for its correct installation and operation.
  These Installation and Operating Instructions should be passed on to any future purchaser or explained to any new operator.
- Safety for the operator as well as trouble-free operation of the unit are only ensured if use is made of original equipment parts. Moreover, use may only be made of those accessories that are specified in the technical documentation or that have been expressly approved and released by Dürr Dental for the intended purpose.

  Any warranty or **guarantee** becomes **invalid** in the case where parts or accessories are used which are not supplied by Dürr Dental.
- Dürr Dental only regard themselves as being responsible for the equipment with regard to safety, reliability and proper functioning if assembly, resettings, changes or modifications, extensions and repairs have been carried out by Dürr Dental or an agency authorized by Dürr Dental and if the equipment is used in conformity with the Installation and Operating Instructions.
- The developer unit herein described conforms to the relevant safety standards valid at this time. All switches, processes, trade marks, software programs and appliances named in this document are registered names.
- Any reprinting of the technical documentation, in whole or in part, is subject to prior written approval of Dürr Dental.

1.4 General Safety Information

This appliance has been so designed and constructed by Dürr Dental that any danger arising from the use of this product is virtually excluded provided it is fitted according to the instructions. However, in order to avoid any possible damage or injury we are obliged to point out the following safety measures.

- When operating this appliance all local rules and regulations must be observed! Any modification whatsoever is not permitted: any guarantees covered by Dürr Dental thus become invalid. In the interests of ensuring problem-free running the owner and operator are responsible for observing all rules and regulations.
- Retain all packing material for possible return of the product to the manufacturer. Take care that it does not fall into the hands of children. Only the original packing guarantees optimal safety of the appliance during transport.

  Should return of the product to the manufacturers be necessary during the guarantee period, Dürr Dental accepts no responsibility for damage occurring during transport where the original packaging was not used!
- This product is a technical appliance and may only be installed and operated or used by someone who has been trained or who has experience of how to use the appliance correctly.
- Before every use the operator must check the functional safety and the condition of the appliance.

- The operator must be knowledgeable in the operation of the appliance.
- The product is not designed to be used in medical treatment areas where there exists the danger of explosion. Areas where explosions could occur are those where flammable anesthetic material, skin cleansers, oxygen and skin disinfectants are present. This appliance is not to be used in any areas where the atmosphere could cause fire.

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1.5 Combining Appliances

- Units may only be connected to the system or to other units when it has been established that there is no reduction of safety for the patient, the operator or the environment through such connection.

  Where it is not absolutely clear from the documentation whether the safety is reduced by such connection, then the operator must establish, e.g. by contacting either the manufacturer or an expert, that there is no danger to the patient, the operator or the environment through such connection.

1.6 Electrical Safety Notes

- This regeneration unit may only be used with a correctly fitted standard earthed plug and socket.
- Before connecting the appliance to the power supply check that the current required and the frequency is the same as that provided at the power outlet.
- No extension cables should be used to connect the machine to the power outlet.
- Warning! Check the appliance and the power supply cables for correct installation and possible damage before switching on. Damaged cables, plugs and sockets must be replaced before use.
- The appliance should not be used in the patient's vicinity. A minimum distance to patient of 1.5 meters is recommended.

1.7 Warnings and Symbols

In the Installation and Operating Instructions use is made of the following terms or symbols to denote information of special importance:

Information, requirements and prohibitions on preventing personal injury and extensive damage to propert.

Special information concerning the economical use of the appliance and other instructions.

Observe Installation and Operating Instructions

CE CE-Labeling

Power on/off

Select program

Enter Confirm selection

2. Product information

2.1 Correct Usage

The DÜRR Regeneration Unit is designed solely for use with DÜRR DENTAL X-ray developer units of the model series XR .. .

Precise observance of the installation and operating instructions is a pre-condition for use of the unit for the intended purpose and for its correct installation, operation and maintenance.

2.2 Incorrect usage

Any other use or use beyond what is specified is deemed to be not for the intended purpose. The manufacturer accepts no liability for damage resulting therefrom. All risk is borne solely by the user.

3. Contents

Regeneration Unit RU 24 for X-ray developers XR 24 .. .

230V - 240V, 50Hz - 60Hz **1700-820-00**
100V - 110V, 50Hz - 60Hz **1700-830-00**

Before connecting the regeneration unit to the developer please make sure to check the following:
Is the regeneration unit to be connected to a developer of the model XR 24, XR 24 II, XR 24 NOVA or
to an XR 24 PRO?

For connection to an XR 24 PRO:
Use the assembly set 1700-284-00 (included)

For connection to an XR 24, XR 24 II, XR 24 NOVA:
Use the conversion set PCB 1700-212-00! This must be ordered separately. See section 3.2 and installation as described in section 11.2.

The assembly set 1700-284-00 is then no longer required.

3.1 Accessories

1 Assembly set
for XR 24 Pro only 1700-284-00

3.2 Special Accessories

The following parts are **not** part of the standard contents.
Order separately if required!

1 PCB conversion set,
only for XR 24 II and XR 24 NOVA 1700-212-00

4. Technical Data

Regeneration Unit RU 24 for X-ray developers XR 24 .. .

Model 1700-820-00 (230V)
Model 1700-830-00 (110V)

Model	**1700-820-00**	
Voltage (V)	230 - 240	230
Frequency (Hz)	50	60
Power consumption (A)	0.65 / 0.9	0.5
Output (W)	50 - 80	50 - 80

Model	**1700-830-00**	
Voltage (V)	100 - 110	100 - 110
Frequency (Hz)	50	60
Power consumption (A)	0.8 / 1.0	0.6 / 0.75
Output (W)	40 - 80	40 - 80

Model	**1700-820-00**	**1700-830-00**
Measurements (cm)		
L x B x H	32 x 36 x 37	
Weight (empty) (kg)	4	

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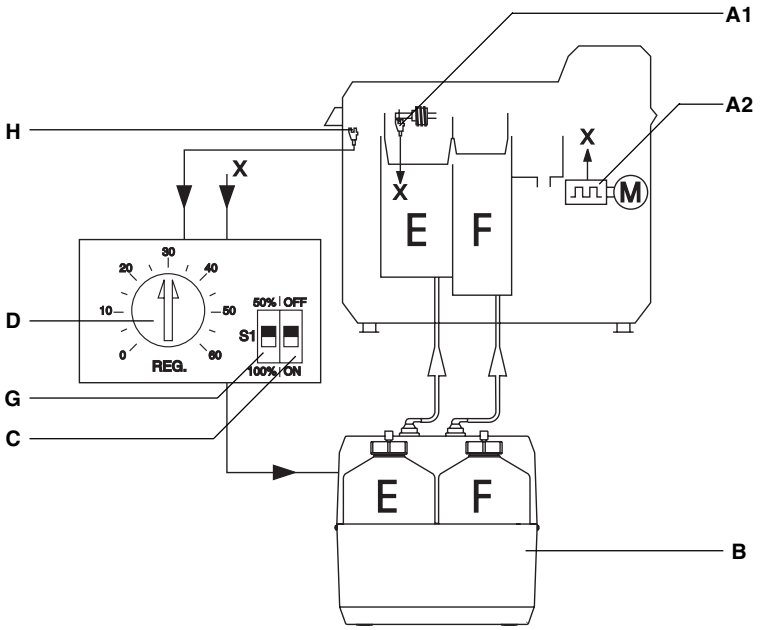
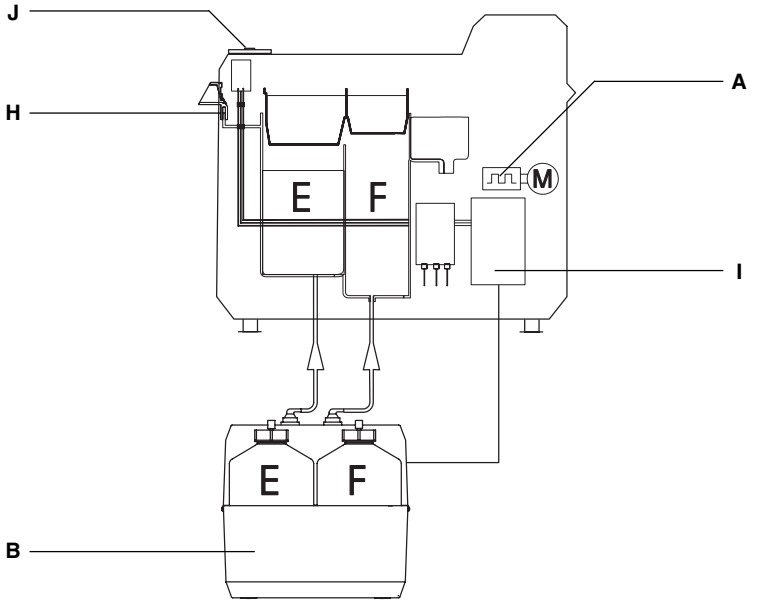
5. FUNCTIONAL DIAGRAM

5.1 Regeneration Unit connected to XR 24, XR 24 II, XR 24 NOVA



5.2 Regeneration Unit connected to XR 24 PRO



6. FUNCTIONAL DESCRIPTION

6.1 Regeneration Unit RU 24 connected to XR 24, XR 24 II, XR 24 NOVA

The regeneration pumps of the X-ray developer are activated every time that the appliance is initially switched on and, furthermore, are reactivated after every length of 1.3m of developed film material when the regeneration switch is correctly set (switch (C) to ON).
For the duration of time that the film intake is activated (via light barrier H) on a film being fed into the appliance, an impulse generator (A) produces rotational impulses which are counted, the number of impulses being proportional to the length of the film.
The potentiometer (D) allows the running time of the regeneration pumps to be set at any interval between 0 s and 60 seconds.
The running time of the regeneration pump is factory set at 30 s. In this time the pumps feed c. 190 ml fresh chemicals into the developer and fixer baths of the X-ray developer from the 5l regeneration canisters.
Switching off the pumps, and / or switching off the X-ray developer transmits a delete impulse to the counter which then resets at zero.

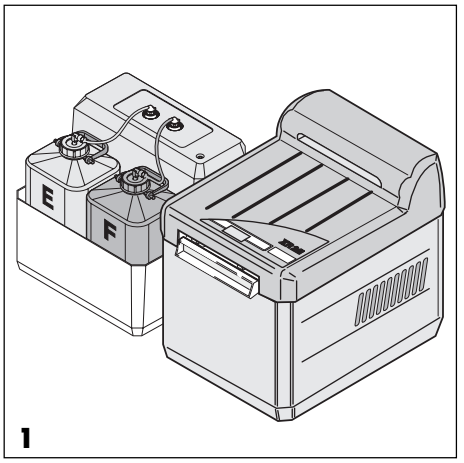
A) Impulse generator
- **A1) XR24:** Drive shaft light barrier
- **A2) XR24 II:** Drive motor impulse generator
- **A2) XR24 Nova:** Drive motor impulse generator

B) Regeneration Unit
C) PCB regeneration switch On/Off
D) Potentiometer for time setting
G) Reduction of regeneration time to 50% / 30s
H) Film intake light barrier

6.2 Regeneration Unit RU 24 connected to XR 24 PRO

The regeneration pumps of the XR 24 PRO are reactivated after every length of 1.3m of developed film material.
For the duration of time that the film intake is activated (via light barrier H) on a film being fed into the appliance, a generator produces impulses which are counted, the number of impulses being proportional to the length of the film.
The software in the service program of the XR 24 PRO allows the running time of the regeneration pumps to be set at any interval between 0 s and 60 seconds, see section 11.3.
The running time of the regeneration pump is factory set at 30 s. In this time the pumps feed c. 190 ml fresh chemicals into the developer and fixer baths of the X-ray developer from the 5l regeneration canisters.
The switching off of the pumps after a regeneration phase automatically transmits an impulse to the counter which then resets at zero. The current counter reading is stored whenever the X-ray developer is swiotched off or in case of a power down.

A) Drive motor impulse generator
B) Regeneration Unit
H) Film intake light barrier
I) PCB
J) Display



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INSTALLATION

7. Set-up alternatives for Regeneration Unit

- **Set-up of Regeneration Unit RU 24 next to the X-ray developer:**

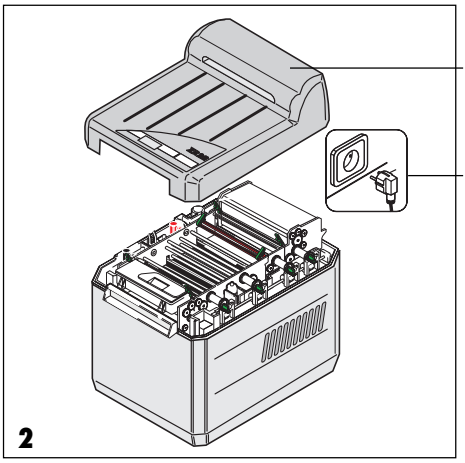
  Where sufficient space is available, this set-up is preferred.

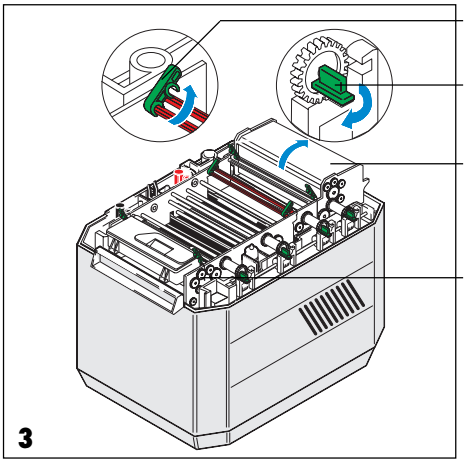
- **Set-up of Regeneration Unit RU 24 in a cupboard:**

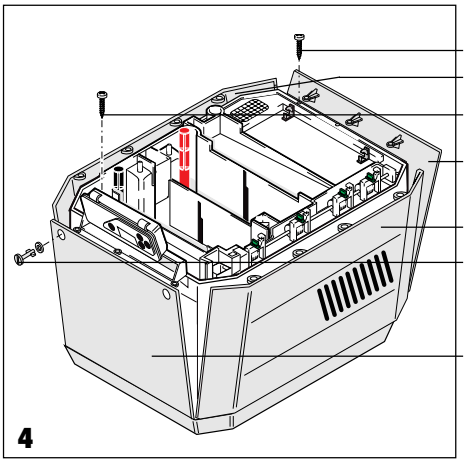
  The operator must be instructed to check the state of the chemicals regularly.

Set-up of Regeneration Unit RU 24 above the level of the X-ray developer is not permissible. This set-up position makes it possible that chemicals leak into the X-ray developer baths.

Please ensure that all connecting hoses from the Regeneration Unit RU 24 to the X-ray developers are laid without any twists or bends. The distance between Regeneration Unit and X-ray developer should not exceed 2m.
When setting-up the X-ray developer, ensure good access to it and to the collecting tanks.







8. Preliminary measures

The following measures need only be taken when the Regeneration Unit is <u>subsequently</u> being connected to a X-ray developer.

- Remove mains plug (1) from socket
- Lift cover (2)
- Drain any chemicals from the X-ray developer
- Open the green catch (3) on the film intake roller set (6)
- Remove roller set (6)
- Open the green catch (3) and the clips (4) of the dryer roller set (5)
- Swing the dryer roller set (5) towards the rear and lift out
- Rinse the baths with warm water
- Close the water tap
- Remove the cover necessary for working

8.1 Remove front cover

- Unscrew the two quick-release screws (11) from the front cover panel (12)
- Unscrew the three Philip's screws (7) and remove the front cover panel (12)

8.2 Remove rear cover

- Unscrew the three Philip's screws (7) and remove the rear cover panel (9)

8.3 Remove side covers

- Remove front (12) and rear panels (9), lift the side panels (10) upwards to remove

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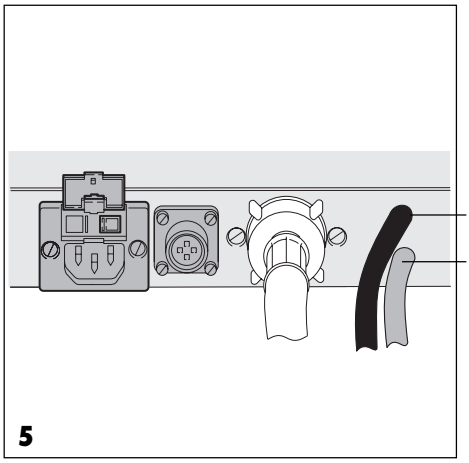


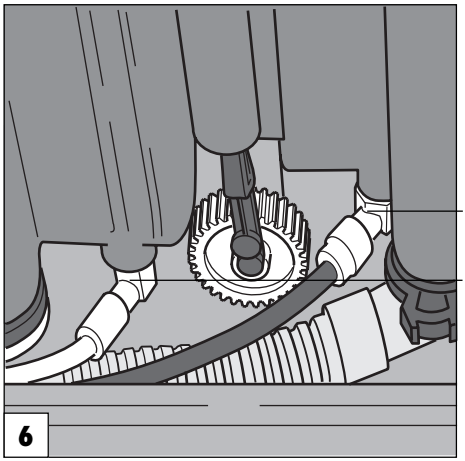
9. Hose connections

9.1 Hose connection to XR24, XR 24 II, XR 24 NOVA or to XR 24 PRO

with serial number up to T005999

The regeneration connection is effected using the nozzles to the tank at 16E and 16F, see figs. 6 and 7.

- The connecting hose from the Regeneration Unit for developer (black) (13) and fixer (red) (14) must be slipped through the prepared holes on the rear of the machine and fed to the grey connecting sleeves (16E) and (16F) on the baths.
- Uncsrew the locking nuts (18) on the connectors (16E) and (16F).
- Remove the black plugs (20). Slide the locking nuts (18) and the grey hose locking ring (19) onto the connecting hose (13), and (14). Slide the connecting hose for developer (black) (13) and fixer (red) (14) all the way onto the appropriate connector sleeve, (16E) and (16F), of the bath and secure in place with the locking nut (18).



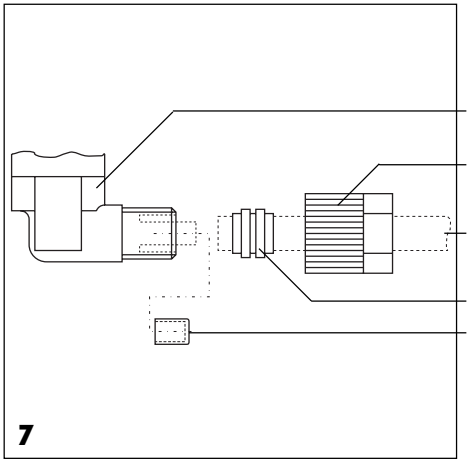
E Developer bath **F** Fixer bath

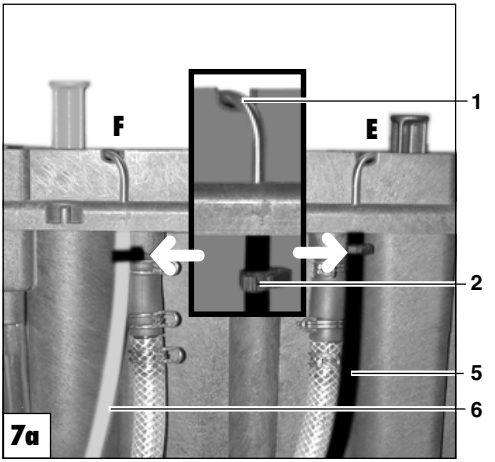
9.2 Hose connection to XR 24 PRO

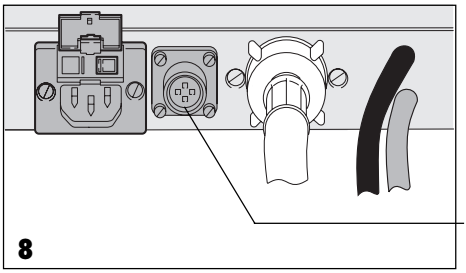
with serial number from T006000

The tank design has been optimised and the regeneration connection is effected at the inlet pipe, see fig. 7a.

Use the assembly set 1700-284-00 “inlet pipe for regeneration unit” with enclosed assembly instructions.







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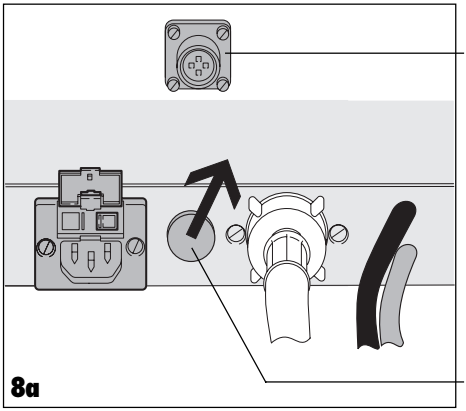

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10. Electrical connections

10.1 XR 24, XR 24 II, XR 24 NOVA

- Place the appliance plug into the socket (15a) to the rear of the X-ray developer and secure in place with the locking screw.

10.2 XR 24 PRO

- Remove socket cap (15b) to the rear of the X-ray developer.
- Use the connection port (15a) from the assembly set provided – 1700-284-00.
- Put connection port into the prepared opening using the 4 screws.
- Connect the cable set as illustrated (Fig. 9).
- Place the Regeneration Unit plug in the socket and secure in place with the locking screw.

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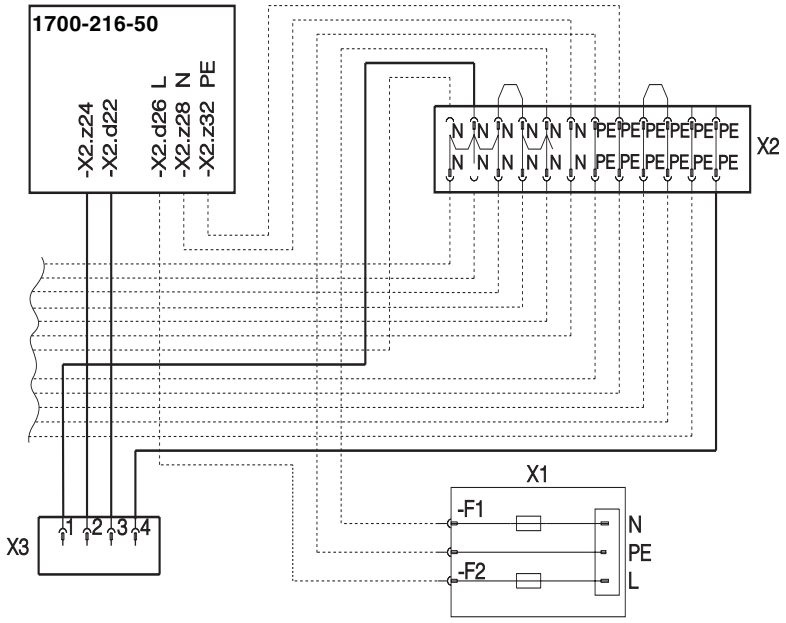
Circuit diagram XR 24 PRO

X1/X2 Plug
X3 Regeneration Unit



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11. Setting the Regeneration Electronics

Before setting, fill the X-ray developer baths with water.

The pump running time should be set according to the individual requirements of the surgery.
We recommend, for example, that where a large number of films are developed the regeneration time should be lowered in order to avoid unnecessary consumption of chemicals.

11.1 XR 24

Switch „S1“ ON / OFF:

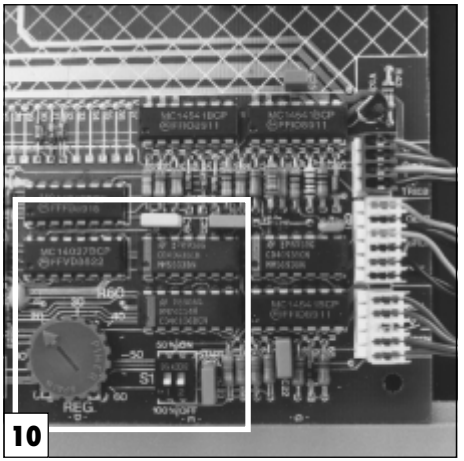
- If switch (22) is set to **OFF**, regeneration will take place after 1.3m of developed film.
- If switch (22) is set to **ON**, then **additionally** regeneration will take place every time the appliance is switched on.

Switch „S1“ 50% / 100%:

- If switch (21) is set to **100%**, then the maximum pump running time of the Regeneration Unit is 60s.
- By turning the switch (21) to **50%** then the maximum pump running time of the Regeneration Unit is halved to 30s.

Potentiometer „REG“ regeneration time

The amount of chemical transported to the X-ray developer depends on the pump running time of the Regeneration Unit.
The potentiometer (23) can be used to set the pump time from >0s to <60s (<30s).
The pump operating time is factory-set at 30s. In this time approx. 190ml fresh developer and fresh fixer are pumped to the baths of the X-ray developer. If further adjustment is necessary the potentiometer knob (23) can be used to change the pump operating time.



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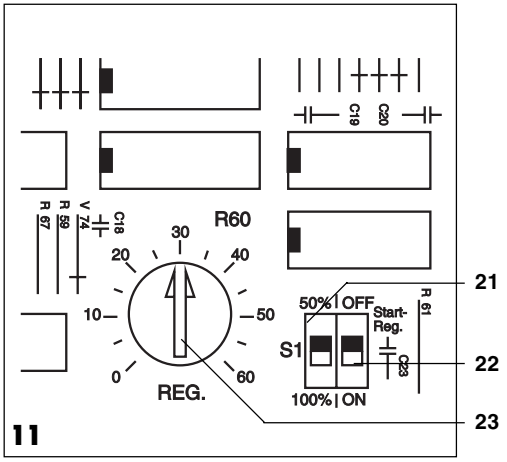

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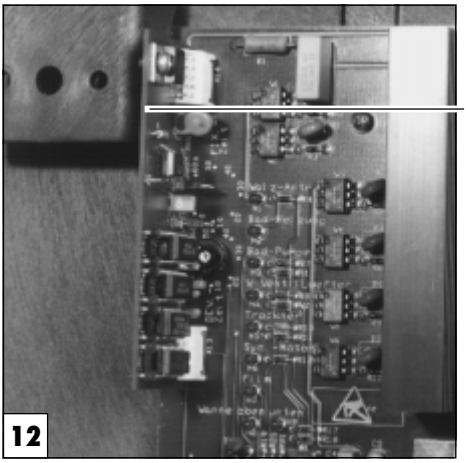

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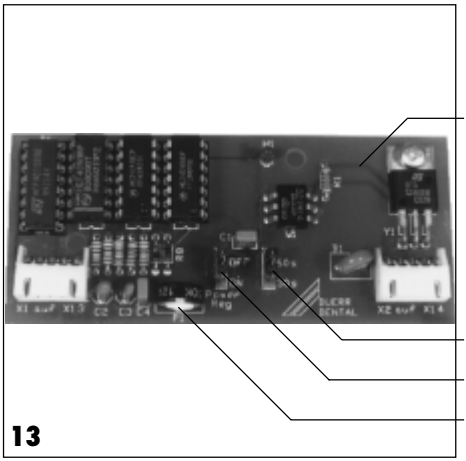
11.2 XR 24 II and XR 24 NOVA

The controller for the Regeneration Unit of **XR 24 II** and **XR 24 Nova** is not integrated into the main board. For these models the controller can be found on the PCB (24), Order No. 1700-212-00, which is slotted onto the main board.
The slots for this printed circuit board can be found in the upper left corner of the main board, and are marked X13 and X14.

Before slottting PCB into position (24) remove power supply to the X-ray developer.

Setting for regeneration and pump operating time are carried out on the PCB (24).



13

Switch „X3“

Regeneration on appliance operation **ON/ OFF**

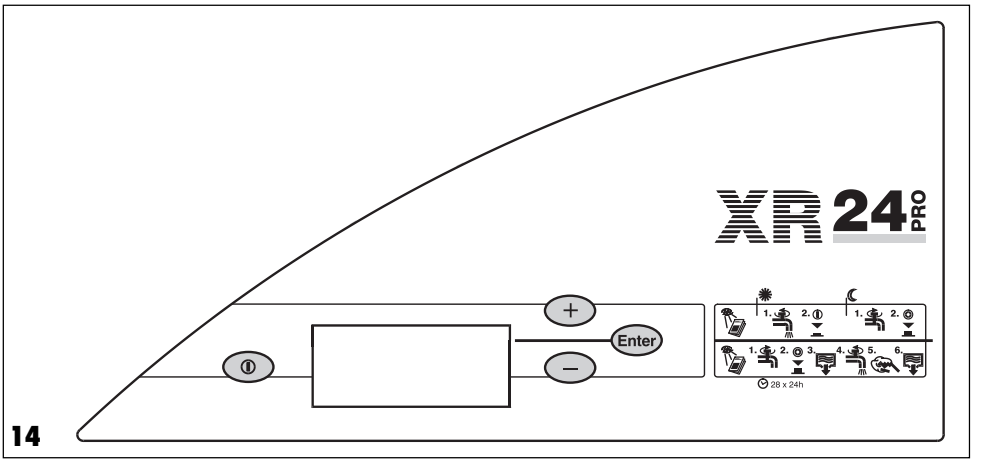
- If switch (27) is set to **ON**, regeneration on appliance operation is **additionally** activated and when the X-ray developer is switched on regeneration occurs.
- If switch (27) is set to **OFF**, regeneration occurs only after 1.3m of film has been developed.

Switch „X4“ 50% / 100%

- If switch (26) is set to **60s** then the maximum pump running time of the Regeneration Unit is 60s.
- If switch (26) is set to **30s** then the maximum pump running time of the Regeneration Unit is halved to 30s.

Potentiometer P1 Reg.-time

The amount of chemical transported to the X-ray developer depends on the pump running time of the Regeneration Unit.
The potentiometer (28) can be used to set the pump time from >0s to <60s (<30s).
The pump operating time is factory-set at 30s. In this time approx. 190ml fresh developer and fresh fixer are pumped to the X-ray developer baths. If further adjustment is necessary the potentiometer knob (28) can be used to change the pump operating time.



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11.3 XR 24 PRO

The regeneration function ON / OFF and the regeneration time can be read on the display of the X-ray developer (Fig. 14).

Please refer to the Installation and Operating Instructions of the X-ray developer XR 24 PRO (order no. 9000-600-74/30) See section 18.6 Service Routine.

- **Start Service Routine**

  ⏻ **Switch off appliance at main switch** (press min. 2 s)

  Simultaneously press ⏻ **+** Enter (min. 4s) Appliance is in service set-up routine

- **Service function selection**

  Using keys and display select REGENERATE, then select REGEN.ON.

- **Alter setting**

  (Factory setting 30s)
  + or – changes the parameter value
  Enter confirms new value

- **Finish service set-up routine**

  ⏻ Switch off appliance at main switch (press min. 2 s)

12. Check Settings

12.1 XR 24, XR 24 II, XR 24 NOVA

Check regeneration at start of operation

- Main switch ON
- When the appliance is switched on the Regeneration Unit must be activated and developer and fixer will be pumped to the baths of the X-ray developer.
- Check the appliance for leaks.

Check regeneration impulse for film length

- Main switch ON
- Set fast forward to ON (film transport set to 3 min.). Lay a film in the film intake such that the film intake flap is activated but so that the film is not transported. After approx. 8 min. the regeneration pumps should switch on and developer and fixer should be pumped into the baths of the X-ray developer.
- Check the appliance for leaks.

Check regeneration pump performance

The developer and fixer pumps should transport the same amount of liquid into the baths of the X-ray developer.

- Fill two measuring beakers with the same amount of water (approx. 0.5 liter). Place these in the Regeneration Unit and place the two hoses from the regeneration containers into the measuring beakers. Check that the pumps feed **the identical amount** of water.
  If necessary alter the pump transport settings.
  See section 13. Setting regeneration pump piston stroke.

12.2 XR 24 PRO

A processor in the electronics of the XR 24 PRO stores the complete developing time, therefore setting option selection is not required.

Check regeneration impulse for film length

- Switch on the X-ray developer and select program „Endo“ (film transport time 2:45 min.).
- Lay a film in the film intake such that the film intake flap is activated but so that the film is not transported. After approx. 7 1/2 min. the regeneration pumps should switch on and developer and fixer should be pumped into the baths of the X-ray developer.
- Check the appliance for leaks.

Check regeneration pump performance

The developer and fixer pumps should transport the same amount of liquid into the baths of the X-ray developer.

- Fill two measuring beakers with the same amount of water (approx. 0.5 liter). Place these in the Regeneration Unit and place the two hoses from the regeneration containers into the measuring beakers.
- The pumps can be activated via the Service Routine of the XR 24 PRO, in order to check the amount of liquids transported.

(Please refer to the Installation and Operating Instructions of the X-ray developer XR 24 PRO, Order No. 9000-600-74/30. **Section 18.6 Service Routine)**

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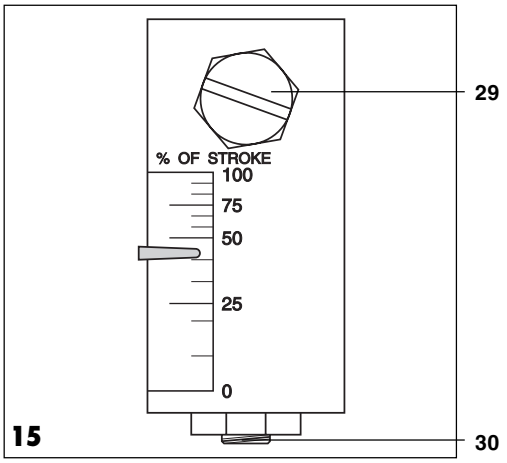

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13. Setting Regeneration Pump Piston Stroke

The amount of chemicals actually transported by the Regeneration Unit can be adjusted by altering the setting of the piston stroke.
If the amounts pumped by the developer pump and the fixer pump are not the same then this can be regulated by altering the piston stroke of each pump.

- Loosen the socket screw (30).
- Use a screwdriver or spanner to turn the hexagonal screw (29) to change the piston stroke setting:

  Turning in the direction 100% = the amount pumped increases

  Turning in the direction 0% = the amount pumped decreases.

The optimal pump volume is factory set (Fig. 15).

- Finally, tighten the hex. socket screw (30).

14. Commissioning

- After finishing all re-setting that may be necessary drain all water from the baths in the regeneration unit of the X-ray developers and place the chemicals into position as appropriate for the model of X-ray developer and according to the Installation and Operating Instructions of that model.

The X-ray developer should never be operated without the roller set!
If a roller set is missing then it is possible for developer and/or fixer to be forced under pressure vertically and spray out of the X-ray developer.
Chemicals irritate eyes and skin and there is danger of severe damage to the eyes.
Without the developer and fixer roller sets transport of chemicals to the baths is no longer possible.
There is danger of chemicals getting in the eyes and of chemicals mixing together.

If chemicals get into eyes, wash thoroughly with water and consult doctor.

15. Cleaning the Regeneration Unit

Every 3 months

- Check whether the collection container of the X-ray developer is empty, if necessary empty into the main canisters.

It is important that these collection containers are empty, otherwise overflowing may result when the chemicals are drained from the baths.

- Drain the chemicals from the baths of the X-ray developers and empty the Regeneration Unit containers and rinse throroughly with warm water. Fill the appliance and the regeneration unit containers with warm water and close the top cover.
- Now refer to the operating instructions of the appropriate model of X-ray developer for next steps: See section 15.1 or 15.2.

15.1 XR 24, XR 24 II, XR 24 NOVA

Regeneration on operation activated

- Switch the X-ray developer on and wait until the pumps of the Regeneration Unit have begun operation. Finally switch off the X-ray developer.

Repeat this operation at least 4 times, so that the Regeneration Unit (pumps and hoses) are thoroughly rinsed through.

- Once the appliance is again in Stand-By Phase (lifting bath in upper position) turn off at main switch.

Regeneration on operation deactivated

- Switch the X-ray developer on and select fast forward operation.
- Lay a film in the film intake such that the film intake flap is activated but so that the film is not transported.
- Wait approx. 30 min., until the Regeneration Unit has operated 4 times. Remove the film from the film intake and let the cycle continue til the end (lifting bath in upper position).
- Switch off X-ray developer.

15.2 XR 24 PRO

- Switch on the X-ray developer and select program „Endo“ (film transport time 3 min.).
- Lay a film in the film intake such that the film intake flap is activated but so that the film is not transported.
- Wait approx. 30 min., until the Regeneration Unit has operated 4 times. Remove the film from the film intake and let the cycle continue til the end (lifting bath in upper position).
- Switch off X-ray developer.

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16. Cleaning the X-ray Developer

Every 3 months

Change chemicals (See Installation and Operating Instructions 9000-600-74/30)

Chemical cleaning of roller sets in cleaning bath, see enclosed notes, A3-Poster
9000-600-14/01
or
Instructions for Cleaning Roller Sets
9000-600-22 (included with XR Clean-Set).

17. Disposal of Chemicals

When disposing of developer and fixer observe all local and regional regulations!
In Germany and many other countries X-ray chemicals must be disposed of as special waste.

TROUBLESHOOTING

The following descriptions of troubleshooting procedures are designed for technical staff only. Repairs may only be carried out by Dürr Dental or by a person or agency authorised by Dürr Dental.

Before carrying out any repair or maintenance procedures remove power supply!

18. Troubleshooting Tips for XR 24, XR 24 II, XR 24 NOVA

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Fault	Possible causes	Remedy
1. Regeneration containers are empty after only a few hours	• Frequent use of the appliance main switch, surgery mains switch or constant interruption of power supply. (Only when Regeneration on Operation activated)	• Switch off the machine only during the midday break and keep on Stand-By during working hours.
	• Electronic relay K3 (of **XR24**) sticks or electronics defect.	• Clean contacts or replace electronics. (Order No. 1700-210-52)
2. Films not fixed completely and veil on film	• Regeneration containers empty.	• Refill the regeneration containers and repeatedly restart at main appliance switch using the regeneration on operation function. If there is still no improvement replace all chemicals in the machine.
	• Pump operating time too short.	• Pump operating time needs adjusting via potentiometer.
	• Regeneration containers or their hoses are interchanged.	• Drain chemicals from the machine and clean thoroughly. Connect the regeneration containers in the correct positions and refill with fresh chemicals.
	• Non-return valve of regeneration pump stuck or wrongly positioned.	• Clean non-return valve, replace if required. Check for correct positioning
	• Regeneration hoses (from the Regeneration Unit to the X-ray developer) twisted.	• Lay the hoses with no twists or bends.
	• Film shelf-life exceeded.	• Observe film shelf-life date.
	• Chemicals shelf-life exceeded.	• Observe chemicals shelf-life date. If shelf-life of chemicals is exceeded do not use and dispose of appropriately.

3.Regeneration pump not working	• Light barrier on the drive shaft (XR24), tachometer generator (XR24-II) or electronics defect.	• The impulse of the light barrier can be checked via Service PCB XR24 (Order No. 1700-031-00); check impulse of the LED drive motor (XR24-II) or replace electronics.
	• Cable connections to Regeneration Unit loose or disconnected.	• Check all cable connections.
	• Regeneration pump motor blocked.	• Check the motor for any mechanical faults (e.g. turn the fan wheel).
	• Regeneration time at potentiometer set at 0s.	• Set potentiometer to ca. 30s and check amount of regeneration material pumped.

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19. Troubleshooting Tips XR 24 PRO

Fault	Possible causes	Remedy
1.Regeneration containers are empty after only a few hours	• Regeneration time set too long.	• Check regeneration timer setting.
	• Electronics do not switch off.	• Replace electronic parts.
2.Films not fixed completely and veil on film	• Regeneration containers empty.	• Refill the regeneration containers. If there is still no improvement replace all chemicals in the machine.
	• Pump operating time too short.	• Re-set pump operating time at higher value.
	• Regeneration containers or their hoses are interchanged.	• Drain chemicals from the machine and clean thoroughly. Connect the regeneration containers in the correct positions and refill with fresh chemicals.
	• Non-return valve of regeneration pump stuck or wrongly positioned.	• Clean non-return valve, replace if required. Check for correct positioning
	• Regeneration hoses (from the Regeneration Unit to the X-ray developer) twisted.	• Lay the hoses with no twists or bends.
	• Film shelf-life exceeded.	• Observe film shelf-life date.
	• Chemicals shelf-life exceeded.	• Observe chemicals shelf-life date. If shelf-life of chemicals is exceeded do not use and dispose of appropriately.
3.Regeneration pump not working	• Motor tachometer generator or electronics defect.	• Check the impulses of the light barrier and the impulses of the roller drive or replace electronics.
	• Cable connections to Regeneration Unit loose or disconnected.	• Check all cable connections.
	• Regeneration pump motor blocked.	• Check the motor for any mechanical faults (e.g. turn the fan wheel).